TANTA UNIVERSITY

FACULTY of ENGINEERING

DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING

EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING

COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)			COURSE CODE: EPM2105
DATE: 2016 - 2017	TERM: FIRST (MIDTERM)	TOTAL ASSESSMENT MARKS:	TIME ALLOWED: 1.5 HOURS

Q1: (50 Marks)

A. Derive expressions for sending end voltage and current for a long transmission line. (20 Marks)

Long Transmission line an Power flow

For long T.L ($\ell > 250$ km), the parameters of a line are not lumped but distributed uniformally as follows:-

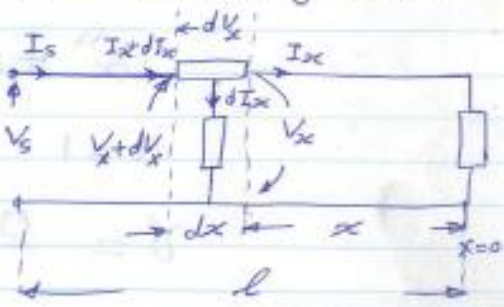
$dV_x = I_x (z\,dx)$

$dV_x/dx = z I_x \rightarrow ①$

$dI_x = V_x (y\,dx)$

$dI_x/dx = V_x y \rightarrow ②$

$\frac{d^2V_x}{dx^2} = z\frac{dI_x}{dx} = zyV_x$



- Second order Linear Differential equation $\Rightarrow$ $V_x = C_1 e^{\gamma x} + C_2 e^{-\gamma x}$ where $\gamma = \sqrt{zy}$ ③
- to calculate C_1 and C_2 :

$x = 0 \rightarrow V_x = V_R, I_x = I_R$ & $x = \ell \rightarrow V_x = V_S, I_x = I_S$

From ①

$I_x = \frac{1}{z}\frac{dV_x}{dx} = \frac{1}{z}(\gamma C_1 e^{\gamma x} + (-\gamma C_2) e^{-\gamma x}) = \sqrt{\frac{y}{z}} C_1 e^{\gamma x} - \sqrt{\frac{y}{z}} C_2 e^{-\gamma x}$

$Z_c = \sqrt{\frac{z}{y}}$

$I_x = \frac{C_1}{Z_c} e^{\gamma x} - \frac{C_2}{Z_c} e^{-\gamma x} \rightarrow ④$

- From ③ : $V_R = C_1 + C_2$ $\quad I_R = \frac{1}{Z_c}(C_1 - C_2)$

$C_1 = \frac{1}{2}(V_R + Z_c I_R)$ $\quad C_2 = \frac{1}{2}(V_R - Z_c I_R)$

$x = \ell \Rightarrow V_x = V_S$ & $I_x = I_S$ ($C_2 < C_1$ بالتعويض في)

$\Rightarrow V_S = \frac{1}{2}(V_R + Z_c I_R) e^{\gamma \ell} + \frac{1}{2}(V_R - Z_c I_R) e^{-\gamma \ell}$

$V_S = V_R \left[\frac{1}{2}(e^{\gamma \ell} + e^{-\gamma \ell})\right] + I_R \left[Z_c \left(\frac{e^{\gamma \ell} - e^{-\gamma \ell}}{2}\right)\right]$

$\cosh \gamma x$ $\qquad$ $\sinh \gamma x$

①

$\therefore V_S = V_R \cosh \gamma l + Z_c \sinh \gamma l \, I_R \quad \rightarrow (I)$

Similarly

$I_S = \frac{1}{Z_c} \sinh \gamma l \, V_R + \cosh \gamma l \, I_R \quad \rightarrow (II)$

$\therefore A = D = \cosh \gamma l, \; B = Z_c \sinh \gamma l, \; C = \frac{1}{Z_c} \sinh \gamma l$

by simplification:

$\cosh \gamma l = 1 + \frac{\gamma^2 l^2}{2!} + \frac{\gamma^4 l^4}{4!} + \cdots = \left(1 + \frac{YZ}{2}\right)$

$\sinh \gamma l = \gamma l + \frac{\gamma^3 l^3}{3!} + \frac{\gamma^5 l^5}{5!} + \cdots = \sqrt{YZ}\left(1 + \frac{YZ}{6}\right)$

$\therefore A = D = \left(1 + \frac{YZ}{2}\right) \; B = Z\left(1 + \frac{YZ}{6}\right) \; C = Y\left(1 + \frac{YZ}{6}\right)$

B. State the electrical and mechanical considerations for transmission line design. (10 Marks)

Electrical Considerations for T.L. Design:

- Low voltage drop
- Minimum power loss for high efficiency of power transmission.
- The line should have sufficient current carrying capacity so that the power can be transmitted without excessive voltage drop or overheating.

Mechanical Considerations for T.L. Design:

- The conductors and line supports should have sufficient mechanical strength:
- To withstand conductor weight, Conductor Tension and weather conditions (wind, ice).
- The Spans between the towers can be long.

C. Define and explain the insulator string efficiency? Can its value equal to 100%? If yes, why? (20 Marks)

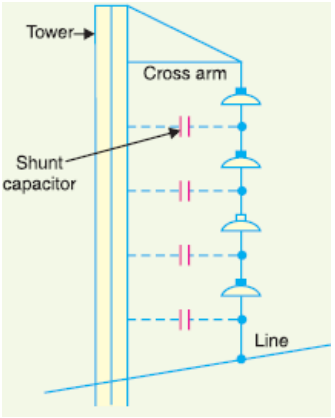
The ratio of voltage across the whole string to the product of number of discs and the voltage across the disc nearest to the conductor is known as **string efficiency** *i.e.,*

$$\text{String efficiency} = \frac{\text{Voltage across the string}}{n \times \text{Voltage across disc nearest to conductor}}$$

where n = number of discs in the string.

A) By using longer cross-arms
B) By grading the insulators
C) By using a guard ring

Th guard ring is the practically method which can be used.



1. By using longer cross-arms. The value of string efficiency depends upon the value of K i.e., ratio of shunt capacitance to mutual capacitance. The lesser the value of K, the greater is the string efficiency and more uniform is the voltage distribution.

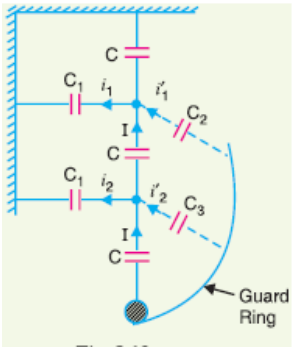
The value of K can be decreased by reducing the shunt capacitance. In order to reduce shunt capacitance, the distance of conductor from tower must be increased i.e., longer cross-arms should be used.

However, limitations of cost and strength of tower do not allow the use of very long cross-arms. In practice, K = 0·1 is the limit that can be achieved by this method.

2. By grading the insulators. In this method, insulators of different dimensions are so chosen that each has a different capacitance. The insulators are capacitance graded i.e. they are assembled in the string in such a way that the top unit has the minimum capacitance, increasing progressively as the bottom unit (i.e., nearest to conductor) is reached.

Since voltage is inversely proportional to capacitance, this method tends to equalize the potential distribution across the units in the string. This method has the disadvantage that a large number of different-sized insulators are required. However, good results can be obtained by using standard insulators for most of the string and larger units for that near to the line conductor.

3. By using a guard ring. The potential across each unit in a string can be equalised by using a guard ring which is a metal ring electrically connected to the conductor and surrounding the bottom insulator. The guard ring introduces capacitance between metal fittings and the line conductor. The guard ring is contoured in such a way that shunt capacitance currents i1, i2 etc. are equal to metal fitting line capacitance currents i′1, i′2 etc. The res ult is that same charging current I flows through each unit of string. Consequently, there will be uniform potential distribution across the units.



Good Luck

Course Examination Committee: **Prof. Doaa Mokhtar**

Dr. Hossam A. A. Saleh

TANTA UNIVERSITY

FACULTY of ENGINEERING

DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING

EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING

COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)			COURSE CODE: EPM2105
DATE: 16/1/2016	TERM: MID_TERM	TOTAL ASSESSMENT MARKS: 20	TIME ALLOWED: 1 HOURS

Q1: (5 Marks) **Fill in the blanks by inserting appropriate words**

a) If sag in overhead line increases, tension in the line ……

b) The balancer machine connected to the heavily loaded side works as a ……..…..

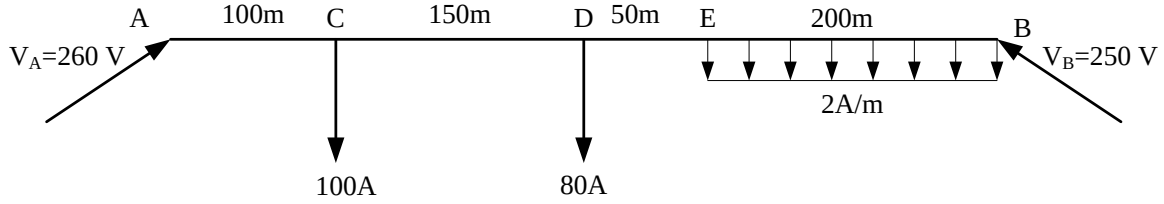
c) A shorter string has ……**string efficiency than a longer one.**

d) The longer the cross arm, the ……....**the string efficiency.**

e) **If the spacing between the conductors is increased, the capacitance of the line is**……

Q2: (10 Marks)

Two-wire dc distributor AB is fed from both ends as shown in the following figure. The resistance per 1000 meters is 1 Ohm. Calculate the current in various sections of the feeder, the minimum voltage and the point at which it occurs in the system. Draw the load current and voltage drop diagrams.



Q3: (5 Marks)

A string insulator has 3 units and each unit has a safe working voltage of 20 kV. Find the maximum line voltage on which it can be operated safely and find the string efficiency. The ratio of self-capacitance to shunt capacitance of each unit is 5:1. Derive any expression used.

Good Luck

1. Fill in the blanks by inserting appropriate words

a) If sag in overhead line increases, tension in the line ***decreases***.

b) The balancer machine connected to the heavily loaded side works as a ***generator***.

c) A shorter string has ***more*** string efficiency than a longer one.

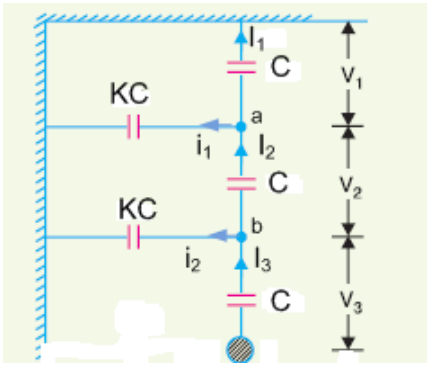
d) The longer the cross arm, the ***greater*** the string efficiency.

e) If the spacing between the conductors is increased, the capacitance of the line is ***decreases***.

2. KCL at node (a) $I_2 = I_1 + i_1$

$wCV_2 = wCV_1 + wkCV_1$

$V_2 = V_1(1+k)$ $\quad ----------> (1)$



KCL at node (b) $I_3 = I_2 + i_2$

$wCV_3 = wCV_2 + wkC(V_1 + V_2)$

$V_3 = V_2 + k(V_1 + V_2)$

$V_3 = (1+k)V_2 + kV_1 = (k + (1+k)^2)V_1 ---> (2)$

$V_3 = 20\ kV, \quad V_1 = 20/1.64 = 12.195\text{kV}$

$V_2 = V_1(1+k) = 12.195 \times 1.2 = 14.634\text{kV}$

$V_3 = (k + (1+k)^2)V_1 = 1.39 \times 8.197 = 11.399\ \text{kV}$

$V_{ph} = V_1 + V_2 + V_3 = 46.829kV$

$V_L = \sqrt{3}\, V_{ph} = 81.015\ kV$

$\mu = \dfrac{V_{ph}}{3 \times V_3} = 78.05\%$

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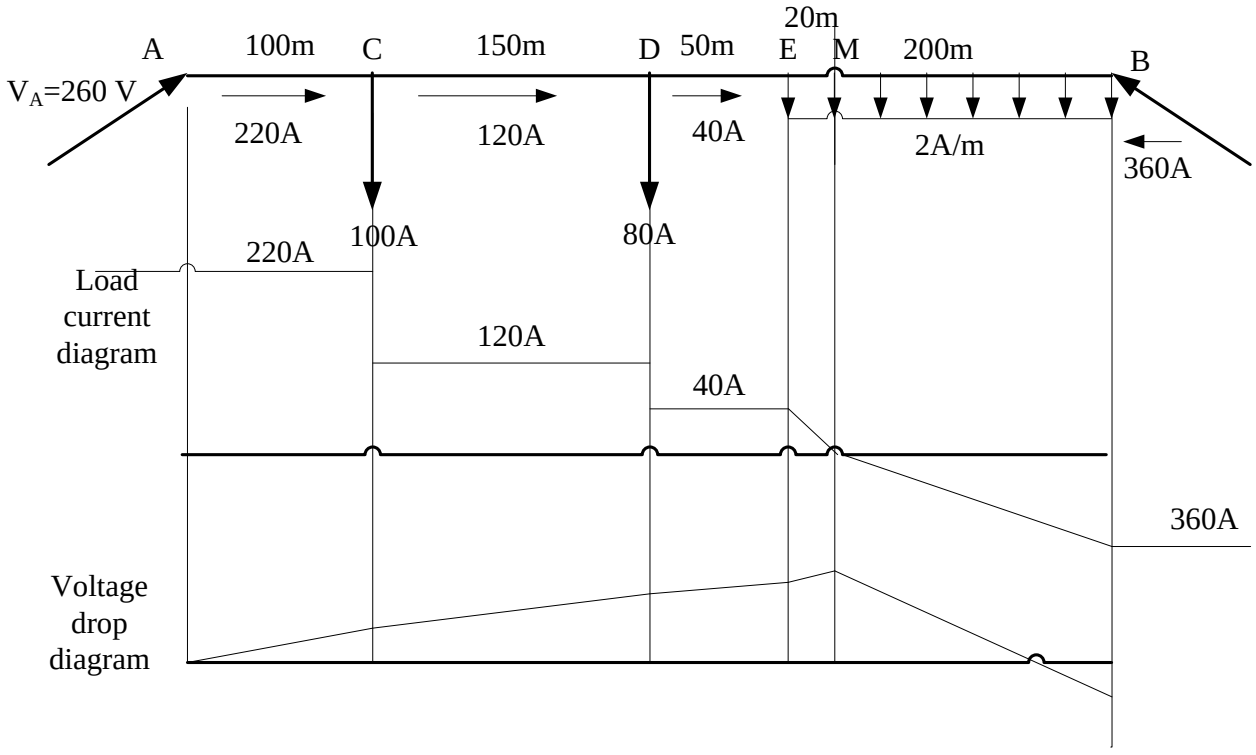
3. $R = 0.001\Omega/m, \quad \Delta V_{AB} = 0 = 0.1I_A + 0.15(I_A - 100) + 0.05(I_A - 180) + \int_0^{200} 0.001(I_A - 180 - 2x)dx$

$\Delta V_{AB} = 10 = 0.1I_A + 0.15(I_A - 100) + 0.05(I_A - 180) + 0.001(I_A\, x - 180x - x^2)]_0^{200}$

$0.5I_A = 110, \quad I_A = 220A$ $\quad ---->> I_B = 360A$

point of* min *voltage at* 320m *from feeding A, orpoint of* min *voltage at* 180m *from feeding B

$V_{Min} = V_B - \int_0^{180} 0.001(I_B - 2x)dx = 250 - 0.001(360x - x^2)]_0^{180} = 217.6V$



TANTA UNIVERSITY
FACULTY of ENGINEERING
DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING
EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING

COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)			COURSE CODE: EPM2105
DATE: 16/1/2016	TERM: FIRST	TOTAL ASSESSMENT MARKS: 90	TIME ALLOWED: 3 HOURS

Q1: (28 Marks)

A. Write short notes on the following:

i. **Skin effect**
ii. **Transposition of conductors**
iii. **Balancer machines set** **(6 Marks)**

B. A 50-Hz double-circuit 3-phase line is arranged as shown in Figure 1. The conductors are completely transposed and are of radius 1 cm each. Find,

- **The inductance per phase per km and the corresponding inductive reactance.**
- **The capacitance per phase per km and the charging current at 138 kV.** **(12 Marks)**

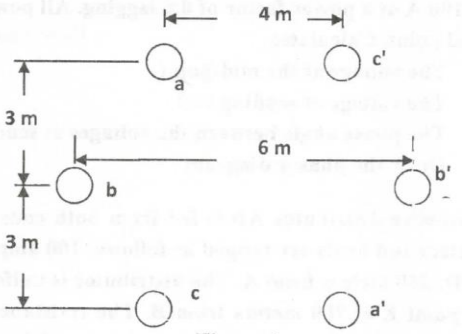


Figure 1

C. A three-phase, 50 Hz transmission line has the following parameters per phase: resistance = 12 Ω, inductance = 63.66 mH and capacitance = 1.06 μF. Using the nominal T-method, calculate:-

- **ABCD constants of the line.**
- **Sending end voltage, current, power, and power factor.**
- **Transmission line efficiency and voltage regulation.**
- **Draw the complete phasor diagram.**

The line supplies a balanced load of 50 MW at 132 kV and a power factor of 0.8 lagging.
(10 Marks)

Q2: (20 Marks)

A. Compare the volume of conductor material required in 3-phase 4-wire system and 3-wire d.c. system assuming that:

i. **The amount of power P transmitted is the same**
ii. **The voltage V at the consumer's terminals is the same**
iii. **The efficiency of transmission is the same**
iv. **The area of X-section of neutral wire is the same of the outers.** **(5 Marks)**

B. Mention the different methods used to improve the voltage distribution over string insulators in overhead transmission lines. Which method is practically used? **(5 Marks)**

C. A string insulator has 4 units and each unit has a safe working voltage of 15 kV. Find the maximum line voltage on which it can be operated safely and find the string efficiency. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Derive any expression used.
(10 Marks)

Q3: **(22 Marks)**

A. Derive an expression for the total power losses and the minimum voltage in a uniformly loaded distributor fed at both ends with equal voltages. **(6 Marks)**

B. A single phase AC distributing feeder 1 km long has a total per conductor resistance and reactance of 0.1 and 0.15 ohm, respectively. At the far end, the voltage is 200 Volt and the current is 100 A at a power factor of 0.8 leading. At the mid-point, there is a load with a current of 100 A at a power factor of 0.6 lagging. All power factors are with reference to the voltage at load point. Calculate:

i. **The voltage at the mid-point**
ii. **The voltage at sending end**
iii. **The phase angle between the voltages at sending end and far end point**
iv. **Draw the phasor diagram** **(8 Marks)**

C. Two-wire distributor AB is fed from both ends at 250 volt. The total length of feeder is 500 meters and loads are tapped as follows: 100 amperes at C; 100 meters from A and 80 amperes at D; 250 meters from A. The distributor is uniformly loaded at 2 A/meter length from point B to point E at 200 meters from B. The resistance (go and return) per 1000 meters is 1 Ohm. Calculate the current in various sections of the feeder, the minimum voltage and the point at which it occurs in the system. Draw the load current, voltage profile and voltage drop diagrams. **(8 Marks)**

Q4: **(20 Marks)**

A. State the electrical and mechanical considerations for transmission line design. **(4 Marks)**

B. Fill in the blanks by inserting appropriate words

i. **If sag in overhead line increases, tension in the line .....**
ii. **A ring main distributor fed at one end is equivalent to ..... fed at both ends with equal voltages.**
iii. **The balancer machine connected to the heavily loaded side works as a .....**
iv. **If the power factor of load decreases, the line losses .....**
v. **A shorter string has .....string efficiency than a longer one.**
vi. **The longer the cross arm, the .....the string efficiency.**
vii. **If the spacing between the conductors is increased, the capacitance of the line is.....**

(7 Marks)

C. Two towers having height of 50 meters and 80 meters support a transmission line at a river crossing. The transmission line has a span of 600 meters between the supports. The weight of the conductor is 2 kg/m length, area of cross-section is 2.5 square cm and the breaking stress is 4200 kg/ square cm. Assuming that the ice weight is 0.5 kg/m length, find the minimum clearance level and the clearance at mid-way between the supports. The safety factor is 4. Bases of the towers can be considered the water level. **(9 Marks)**

Good Luck

Course Examination Committee: **Prof. Ahmed Refaat**
Dr. Doaa Mokhtar
Dr. Hossam A. Abd el-Ghany

C. Each conductor of a three phase high voltage transmission line is suspended by a string of 4 suspension type disc insulators. If the potential difference across the second unit from the top is 13.2 Kv and across the third from top is 18 Kv. Determine the voltage between conductors and string efficiency. (10 Marks)

Q3: (25 Marks)

A. Derive an expression for the capacitance of a transposed three phase transmission line with equilateral spacing. (5 Marks)

B. A distributor AB is fed from both ends. At the feeding point A the voltage is maintained at 235 V and at B 236 V. The total length of feeder is 200 meters and loads are tapped, 20 amperes at 50 meters from A, 40 amperes at 75 meters from A, 25 amperes at 100 meters from A and 30 amperes at 150 meters from A. The resistance per 1000 meters of one conductor is 0.4 ohm. Calculate the current in various sections of the feeder, the minimum voltage and the point at which it occurs in the system, draw the voltage distribution over the feeder. (10 Marks)

C. A three phase transported 345 Kv, 200 Km line has the following line impedance $z=0.032+j0.35$ ohm/km and admittance $y=j\ 4.2\ \mu s/km$. full load at the receiving end of the line is 700 Mw at 0.99 leading power factor at 95% of the rated voltage. Assume a medium length line, determine:

1. ABCD parameters of the nominal π circuit
2. Sending end voltage, current and power
3. Transmission line efficiency and voltage regulation. (10 Marks)

Q4: (25 Marks)

A. Derive an expression for the total power losses and the position of minimum voltage in a uniformly loaded distributor fed at both ends with equal voltage. (5 Marks)

B. State the properties of the conductor materials and commonly used materials. (3 Marks)

C. In a 500/250 dc 3- wire system there is a current of 1200 A on the positive side and 1000 A on the negative side and a motor load of 200 Kw across the outers. The loss in each balancer machine is 5 Kw calculate the current in the main machine and load in each balancer machine. (7 Marks)

D. The towers of height 30 meters and 90 meters support transmission line at water crossing. The horizontal distance between the towers is 500 meters. If the tension in the conductor is 1600 kg. Find the minimum clearance of the conductor and water and the clearance mid-way between the supports. The weight of conductor is 1.5 kg/m. Bases of the tower can be considered at the water level. (10 Marks)

End of Exam Wish you all the best

Dr. Ahmed Azmy - Dr. Said Allam - Dr. Ayman Hoballah

TANTA UNIVERSITY

FACULTY of ENGINEERING

DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING

COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)		(SECOND YEAR)	COURSE CODE: EPM2106
DATE: 11/01/2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 90	TIME ALLOWED: 3 HOURS

NOTE: Systematic arrangement of calculations and clear neat drawings are essential. الاشغل مقرن من 4 اسئلة في ورقتين
Any data not given is to be assumed – Answer as many questions as you can.

Q1: (20 Marks)

A. Choose one answer: (4 Marks)

1-The 11 KV lines use

A. both pin and suspension insulator B. suspension type insulator

C. strain type insulator D. pin type insulator

2- with bundled conductor

A. The corona starting voltage increases B. The corona starting voltage decreases

C. The corona starting voltage unaffected D. none of the above

3- As the spacing between phase conductors increases, the line inductance

A. increases B. decreases C. remains the same

4 As compared to regulation at unity power factor, the regulation at 0.8 leading, the power factor is

A. higher B. lower C. same

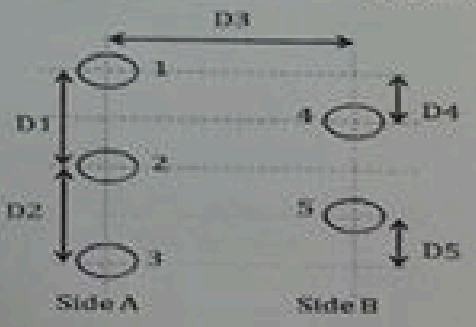
B. State the types of power stations and discuss the construction of transmission systems. (6 Marks)

C. A single phase distributor has a resistance of 0.2 ohm and reactance 0.3 ohm. (10 Marks)
At the far end the voltage Vb =240 volt, the current is 100 A and the power factor is 0.8 lagging. At the midpoint A, a current of 100 A is supplied at a power factor of 0.6 lagging with reference to voltage at point A. Find the

a. Supply voltage Vs and supply current
b. Power factor at supply and phase angle between the supply voltage and Vb

Q2: (20 Marks)

A. Derive an expression for the inductance of each side of the single phase line and the inductance of the complete line.
Assume D1=D2=D meter, D3=2D meter, D4=D5=0.5D meter, The relative permeability is 100. (6 Marks)



B. Explain the main job and properties of insulators in power system and discuss the methods used to improve the efficiency of insulator string. (4 Marks)

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DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING
EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING

COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)	COURSE CODE: EPM2106
DATE: 22/01/2019 TERM: FIRST TOTAL ASSESSMENT MARKS: 90	TIME ALLOWED: 3 HOURS

Notes: Any data not given is to be assumed – Answer as many questions as you can.
Answer as brief as possible

تتضمن سؤالين من 4 أسئلة في ورقتين

Q1: (25 Marks)

A. State the types and advantages of renewable energy renewable energy sources. Discuss the main precautions and regulations which electrical workers must follow to avoid any damage to the equipment and workers. (6 Marks)

B. A DC ring distributor ABCDEA with interconnection between B and D is fed at point A. The resistances of the go and return in sections AB, BC, CD, DE , EA, and BD are 0.1, 0.075, 0.2, 0.25, 0.3 and 0.1 ohm respectively. The supplied currents at B, C, D, and E are 30, 50, 20 and 30 A respectively. $V_A = 200V$ (6 Marks)

1. Calculate the current in the interconnector and the voltage at each load point.
2. Sketch the voltage distribution across the ring

C. A three phase transposed 345 k V, 200 km line has the following line impedance z= 0.032+j 0.35 ohm/meter, and the admittance y=j 4.2 μs/km. The full load at the receiving end of the line is 700 Mw at 0.9 leading power factor and 95% of rated voltage. Assume a medium length line and determine:-

1. ABCD parameters of the nominal π circuit.
2. Sending end voltage, current, and active power.
3. Transmission line efficiency and voltage regulation.
4. Draw the complete Phasor diagram. (13 Marks)

Q2: (20 Marks)

A. What is the function of balancer machines set in DC distribution and describe its construction and theory of operation? (5 Marks)

B. Derive an expression for the total power losses and the position of minimum voltage in a uniformly loaded distributor fed at both ends with unequal voltages? (5 Marks)

C. Each conductor of a three phase high voltage transmission line is suspended by a string of 4 suspension type disc insulators. If the potential difference across the second unit from the top is 13.2 KV and across the third from top is 18 KV. Determine the voltage between conductors and string efficiency. (10 Marks)

Q3: (20 Marks)

D. Derive an expression for the inductance of a single phase two-wire transmission line with a radius r meter and distance D meter. Discuss the effect of the distance between the conductors and radius on the value of inductance. (6 Marks)

A. A single phase 30 Km long transmission line with diameter of 5 mm and 1.5 meter between conductors. If the supply voltage is 50 KV, determine the charging current at no load. (4 Marks)

B. A 2-wire distributor AB is fed from both ends at 250 volt. The total length of feeder is 500 meters and loads are tapped, 100 amperes at C ,100 meters from A, 60 amperes at D, 250 meters from A. The distributor is uniformly loaded at 1 A/meter length from point B to point D at 200 meters from B. The resistance (go and return) per 1000 meters is 1 ohm. Calculate the current in various sections of the feeder, the minimum voltage and the point at which it occurs in the system. Draw the voltage distribution over the feeder. (10 Marks) (10 Marks)

Q4: (25 Marks)

A. Explain how the ABCD constants of transmission lines can be determined experimentally? (5 Marks)

B. 40 km short long transmission line delivers 8MW at power factor 0.8 lagging and a line voltage of 11 KV. The single conductor impedance is (0.1 + j 0.3) ohm/km. (10 Marks)
- Find the sending end voltage and power factor
- Calculate the transmission efficiency and voltage regulation
- Draw the phasor diagram

C. The towers of height 30 meters and 90 meters support transmission line at water crossing. The horizontal distance between the towers is 500 meters. If the tension in the conductor is 1600 kg. Find the minimum clearance of the conductor and water and the clearance mid-way between the supports. The weight of conductor is 1.5 kg/m. Bases of the tower can be considered at the water level. (10 Marks)

End of the Exam: Page 2/2

WISH YOU ALL THE BEST

Dr. Ayman Hoballah

TANTA UNIVERSITY

FACULTY of ENGINEERING

DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING

EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING

COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)			COURSE CODE: EPM2106
DATE: 17/12/2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 30	TIME ALLOWED: 1.5 HOURS

Q1: (10 Marks)

A. Derive an expression for the inductance of a transposed three phase single circuit transmission line with equilateral spacing and find the inductance per unit length of the balance three phase whose conductors are placed at corners of triangle whose sites 3, 4, and 5 meter where the diameter of each conductor is 2 cm.

B. A DC ring distributor ABCDEA with interconnection between B and D is fed at point A. The resistances of the go and return in sections AB, BC, CD, DE , EA, and BD are 0.1, 0.075, 0.2, 0.25, 0.3 and 0.1 ohm respectively. The supplied currents at B, C, D, E are 20, 30, 20 and 50 A respectively. Calculate:

- The current in the interconnector
- The voltage at each load point

$V_A = 200\ V$

Q2: (10 Marks)

A. State the types and advantages of renewable energy renewable energy sources. Discuss the main precautions and regulations which electrical workers must follow to avoid any damage to the equipment and workers.

B. A 3-phase, 4 wire system supplies a voltage of 400/230 volt is loaded as follows:

B) 30 Kw, three phase motor having an efficiency of 85% and 0.8 lagging power factor
C) A single phase load of 3 KW at 0.9 lagging power factor between R and N
D) A single phase load of 4KW at unity power factor between Y and N
E) A single phase load of 3-KW at 0.85 lagging power factor between B and

Calculate the currents in all lines and the change in line currents if the load from B to N is removed.

Q3: (10 Marks)

A. 10 km short ~~long~~ transmission line delivers 8MW at power factor 0.8 lagging and a line voltage of 11 KV. the impedance of a single conductor is (0.1 + j 0.3) ohm/km.

- Find the sending end voltage and power factor
- Calculate the transmission efficiency and voltage regulation
- Draw the phasor diagram

B. A 2 – wire feeder OAB has a load of 100 amperes at B and 50 amperes at A both at power factor 0.8 lagging. The impedance of OA is (0.5+j0.1) ohm and that of AB is (0.1+j 0.15) ohm. If the voltage at the far end "B" is maintained at 400 V. Find the voltage at A and at the supply end. Consider that the power factors are with respective to the voltages at the load points.

WISH YOU ALL THE BEST

Dr. Ayman Hoballah

انتهت الأسئلة